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## Asphalt Paver Engineering Control Systems

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## ASPHALT PAVER ENGINEERING CONTROL SYSTEMS

### THE NEED

At present, there are approximately 300,000 asphalt paving workers who are routinely exposed to asphalt fume. Presently, limited data exists concerning the level of exposure and subsequent health effects for paving workers. Some workers have reported acute health effects including breathing difficulty; burning of the eyes, nose, throat, and skin; headaches; and nausea. Animal studies indicate that asphalt fumes may be carcinogenic under certain conditions. Asphalt paver engineering controls were implemented to reduce workers' exposures to hot-mix asphalt fumes in highway paving operations. This is accompanied through the partnership including National Institute for Occupational Safety and Health (NIOSH).



**FIGURE 1 SIDE-BY-SIDE PHOTOGRAPH OF A PAVER UNDERGOING  
A SMOKE-TEST CHALLENGE OF ASPHALT PAVER ENGINEERING CONTROLS**

### THE TECHNOLOGY

The engineering control method developed for highway class pavers includes ventilation systems, baffles, and enclosures to capture the generated contaminant within the paver's auger area and to exhaust it before it enters the workers' working environment. The control systems capture up to 80 percent of fume emissions coming from the auger area, the greatest source of fume emissions from paving machines. The controls cover the auger area of the paver where fumes are generated. They then transport the fumes through a duct system and exhaust them through a stack away from the worker. This system significantly reduces worker's exposure to asphalt fumes.



**FIGURE 2 VENTILATION CONTROL SYSTEM INTO PAVING MACHINE**

## **THE BENEFITS**

Performance results on first-generation prototypes ranged from 17-100% capture efficiency. After incorporating design changes, the capture efficiencies improved to a range of 80-100% by July 1997. Five of the control systems were also evaluated during actual paving environments. These tests revealed fume reductions up to 80% from the pavers' auger area.

## **STATUS**

Initiated by the National Asphalt Pavement Association (NAPA), the effort to reduce workers' exposures to asphalt fumes involved 5 asphalt paver manufacturers who represented more than 80 % of the highway - class paver market. Through an agreement with the Department of Transportation (DOT), NAPA requested that the NIOSH assist the manufacturers with their prototype designs and independently evaluate the performance of each prototype. To reach the goal, manufacturers suggested designs based on their knowledge of machine structure and operating needs. NIOSH scientists provided crucial engineering and industrial hygiene knowledge to measure the volume of fume captured by each prototype system, analyzed results, and suggested design improvements. NIOSH researchers developed and published a test protocol for evaluating the asphalt paver under controlled conditions. NIOSH used this protocol to evaluate the control systems of each of the paver manufacturers and provided recommendations to optimize the performance of each control system. The diverse partners in the initiative signed a voluntary, industrywide agreement with the Occupational Safety and Health Administration (OSHA) to observe the guidelines and to incorporate effective fume emission controls in all new highway pavers. As of September 1998, over 700 of the first generation of pavers built according to the guidelines have rolled off the assembly line.



**FIGURE 3 NIOSH ENGINEERS CONDUCT AN ENGINEERING PERFORMANCE TEST OF ASPHALT PAVER ENGINEERING CONTROLS IN TIPPECANOE COUNTY, INDIANA.**

## **BARRIERS**

The engineering control system for asphalt pavers is for highway-class pavers, not for non-highway-class pavers, because the research on engineering controls is based on prototype controls applied to highway-class pavers. And current research applies only to new equipment that has the engineering control designs integrated into the basic paver design. Manufacturers must develop kits for reducing worker exposures without creating tripping hazards from duct work, increased noise exposure from externally mounted exhaust fans, or undue burdens on paver hydraulic or electrical systems.

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## **REFERENCES**

1. NIOSH - Reducing Exposure to Asphalt Fumes <http://www.cdc.gov/niosh/innovatn.html>
2. Engineering Control Guidelines for Hot Mix Asphalt Pavers - NIOSH, U.S. Department of Health and Human Services. 1997



## **REVIEWERS**

Peer reviewed as an emerging construction technology

## **DISCLAIMER**

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## **PUBLISHER**

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